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(19) **United States**(12) **Patent Application Publication****Wong et al.**(10) **Pub. No.: US 2017/0052343 A1**(43) **Pub. Date: Feb. 23, 2017**(54) **OPTICAL POSITION SENSING WITH TEMPERATURE CALIBRATION**(71) Applicant: **Apple Inc.**, Cupertino, CA (US)(72) Inventors: **Calvin K. Wong**, Cupertino, CA (US);
Ho Seop Jeong, Palo Alto, CA (US)(73) Assignee: **APPLE INC.**, Cupertino, CA (US)(21) Appl. No.: **14/828,434**(22) Filed: **Aug. 17, 2015****Publication Classification**(51) **Int. Cl.****G02B 7/28** (2006.01)**G01D 5/26** (2006.01)**G02B 7/02** (2006.01)**H04N 5/225** (2006.01)**G02B 7/08** (2006.01)**G01M 11/08** (2006.01)**H04N 5/232** (2006.01)(52) **U.S. Cl.**CPC **G02B 7/28** (2013.01); **G01M 11/08**
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(57)

ABSTRACT

In some embodiments, an apparatus for performing temperature-compensated measurement of a position of a lens assembly is attached to an autofocus actuator. In some embodiments, the apparatus includes a light source for emitting light in a first direction. In some embodiments, a measurement sensor is affixed for receiving light reflected from a reflector. In some embodiments, a lateral shield is affixed in a position blocking detection by the measurement sensor of light having been emitted from light source but having not been reflected from the reflector. In some embodiments, a monitoring sensor is affixed in a position relative to the light source to receive light having been emitted from light source but having not been reflected from the reflector. In some embodiments, a transverse shield is affixed in a position blocking detection by the monitoring sensor of light reflected from the reflector.

